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NOTE

Eremocoris borealis Dallas (Hemiptera: Lygaeoidea: Rhyparochromidae): A Litter-Inhabiting Seed Bug in Cones of Pitch Pine (*Pinus rigida*)

The family Rhyparochromidae is the most speciose of families that formerly composed the diverse Lygaeidae. Though long suspected to represent a paraphyletic group (e.g., Leston 1958, Southwood and Leston 1959, Schuh and Slater 1995), the Lygaeidae in its traditional sense was not formally reconstituted until Henry (1997) proposed family status for Rhyparochrominae and 10 other subfamilies, including the nominate Lygaeinae.

Rhyparochromids live almost exclusively at the interface of the ground and litter where they feed on fallen seeds (Sweet 1960, 1964). They are most efficiently collected by a "scratch and search" of dead leaves and other ground litter (Barber 1928, Sweet 1964, Slater and Baranowski 1978). With few exceptions, drymine rhyparochromids are typical litter inhabitants. Among North American drymines, *Eremocoris depressus* Barber (Wheeler 1996) and species of the Holarctic genus *Gastrodes* Westwood (Usinger 1933, 1938; Sweet 1964; Ashlock 1979) are arboreal, feeding on seeds in the cones of pines (*Pinus* spp.) and other conifers.

Eremocoris Fieber, a Holarctic genus, has twelve species in Canada and the United States and nine additional species in Mexico (Slater 1964; Slater and O'Donnell 1995). Eastern North American species, in addition to *E. depressus*, are *E. borealis* Dallas, *E. ferus* Say, and *E. setosus* Blatchley. Bionomics of the seldom-collected *E. setosus* are little known, whereas those of the common *E. borealis* and *E. ferus* have been studied in the field and laboratory by Sweet (1964), who included data for both species under *E. ferus* even though he considered them to represent cryptic species. Based on behavioral, distributional, ecological, morphological, and reproductive evidence, Sweet (1977) elevated *E. borealis* from synonymy with *E. ferus*. He recognized *E. borealis* as more northern, ranging in eastern North America from Newfoundland south along the Appalachians to North Carolina and Tennessee; in the Midwest, its southern limits are Michigan and Wisconsin. The distribution of *E. ferus* is Austroriparian-Carolinian: southern New York and lowland areas of New England south to the Gulf of Mexico, with Illinois, Indiana, and Ohio marking the northern range limit in the Midwest. Relictual populations are found in the Edwards Plateau of Texas (Sweet 1977). Both species are bivoltine, overwinter as adults, and feed on seeds of coniferous and hardwood trees in loose ground litter in cool or shaded habitats (Sweet 1964).

On 14 August 1993, on a ca. 15-m pitch pine (*Pinus rigida* Mill.) in Maine, I encountered not only the arboreal *E. depressus* but also *E. borealis* when cones within reach (up to ca. 2.5 m) were tapped with an ax handle over a shallow beating net. Six ♂ and 4 ♀ of *E. borealis* and 9 ♂ and 4 ♀of *E. depressus* were collected (additional adults of both species were observed in cones) in Cumberland Co., 8 km NNE of Gray at the intersection of Mayall Rd. and Bluff Circle (formerly Blueberry Bluff Circle), 43° 55.74′N, 70° 19.45′W. Specimens of both species have been deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC.

Ashlock and A. Slater (1988), in the most recent catalog of North American Heteroptera, did not record *E. borealis*

from Maine but referred to Sweet's (1977) comment that old northern records of *E. ferus* pertain to the former species. Thus, Parshley's (1914) records of *E. ferus* from Maine should be considered the first for *E. borealis* in the state.

Nymphs of *E. depressus*, in contrast to those of the litter-inhabiting *E. borealis* (Sweet 1964), feed on seeds in second-year, partially opened cones of pitch pine in northeastern states (Wheeler 1996). The occasional movement of rhyparochromines from the litter biotope is assumed to represent dispersal. *Eremocoris ferus*, for example, disperses in early spring (Sweet 1964), and *E. borealis* and *E. ferus* can become household nuisances in summer when they enter houses or congregate on porches or siding (Wheeler 1989). But the presence of seeds in cones that yielded *E. borealis* and *E. depressus*, including nymphs of the latter species, suggests that in mid-August adults of *E. borealis* were not merely resting in the tree or seeking shelter in cones, but feeding on seeds.

Although *E. borealis* and *E. ferus* feed in the field and laboratory on seeds of various woody plants, they show a marked tendency for those of conifers (Sweet 1964, 1977); western North American species of the genus feed on fallen conifer seeds (Sweet 2000). The presence of multiple adults of *E. borealis* in cones of pitch pine in Maine might not indicate a shift to arboreal seed feeding. The collection of adults, however, reinforces an association with conifers and illustrates behavioral plasticity that allows a litter inhabitant to move opportunistically into cones of a pine tree where it might feed on seeds.

Slater et al. (1993) suggested that arboreal habits in the myodochine rhyparochromid *Slaterobius quadristriatus* (Barber), which also feeds on seeds in pitch pine (and jack pine, *P. banksiana* Lamb.) cones, represent a recent niche shift in an otherwise litter-inhabiting genus. The arboreal habits and flattened body of *E. depressus* presumably reflect derived characters (Wheeler 1996). Phylogenetic analysis of *Eremocoris* should help determine if colonization of an arboreal microhabitat by *E. depressus* actually is a derived condition.

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A. G. Wheeler, Jr., *Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634-0315, U.S.A. (e-mail: awhlr@clemson.edu)*